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# THE FOSSA PHARYNGEA IN AMERICAN INDIAN CRANIA

By LOUIS R. SULLIVAN

THE fossa pharyngea, fovea bursae, or medio-basial fossa is a small oval depression in the ventral surface of the basilar part of the occipital bone. The major axis lies in the antero-posterior direction in the median line. It varies in depth from 2 millimeters to 7 millimeters. The width is approximately 4 millimeters on the average while the length varies from 5 to 11 millimeters.

The function or purpose of the fossa is not altogether clear. Anatomical text-books dismiss it with a sentence. Thompson<sup>1</sup> writing in Cunningham says: "An oval pit, the fovea bursae or pharyngeal fossa, is sometimes seen in front of the tuberculum pharyngeum. This marks the site of the bursa pharyngea. . . . The origin and morphological significance of this pouch are not yet solved." Romiti<sup>2</sup> and Agostino<sup>3</sup> claim that the fossa pharyngea is produced by a pharyngeal diverticulum either abnormal or accessory. This is in agreement with the opinion stated above. Perna<sup>4</sup> concludes that the fossa pharyngea can be explained as a survival of that part of the median basilar canal which passes below the perichondrium on the ventral surface of the basilar portion of the occipital bone. The basilar part of the occipital bone ossifies like a vertebra and the fossa is the result of the non-ossification of the hypochordal bow element due to the position of the notochordal element in this region. I am not in a position to state the relative merits of the two opinions nor am I altogether certain that they are necessarily contradictory.

<sup>1</sup> Arthur Thompson and David Waterson in *Cunningham's Text-book of Anatomy*. New York, 1917.

<sup>2</sup> Romiti, 1891.

<sup>3</sup> Agostino, 1901.

<sup>4</sup> Perna, 1906.

However, its anthropological importance and utility are not wholly dependent on its physiological, morphological, or phylogenetic significance, but in great part on its relative frequency. According to all authors consulted the fossa pharyngea is a rather uncommon structure both in man and other animals. Perna<sup>1</sup> and Agostino<sup>2</sup> give very little data on its frequency. Romiti<sup>3</sup> found it five times in 700 crania (0.7%). He quotes Gruber as finding it 46 times in 4000 to 5000 skulls or in about 1 percent of the cases examined. Le Double<sup>4</sup> records its frequency as 1.4 percent on the basis of 5000 skulls examined. Rossi<sup>5</sup> is the only author to my knowledge who has attempted to segregate his material racially. His results follow:

- In 2911 European crania the fossa occurred 33 times or 1.1%.
- In 801 non-European crania the fossa occurred 31 times or 3.87%.
- In 240 Papuan crania the fossa occurred 10 times or 4.16%.
- In 159 Asiatic crania the fossa occurred 7 times or 4.40%.

The only conclusion one may draw from the above data is that the fossa pharyngea is of relatively rare occurrence and certainly

TABLE I  
GROUPS REPRESENTED BY AT LEAST TWENTY CRANIA WHICH SHOW A RELATIVELY HIGH FREQUENCY OF THE PHARYNGEAL FOSSA

Group	Number of Skulls <sup>6</sup>	Number with Pharyngeal Fossa	Percent with Pharyngeal Fossa
"Basket Maker" Utah, Grand Gulch.....	97	26	26.8
Cora Indian Mexico .....	21	5	23.8
California Indian (Hrdlička) <sup>7</sup> .....	42	7	16.6
Huichol Indian, Mexico.....	32	5	15.5
Utah, Grand Gulch, deformed.....	22	3	13.6
Tlancapantla, Mexico.....	23	2	8.6
San Simon, Mexico.....	49	4	8.2
Tarahumare, Mexico.....	48	3	6.2
Total.....	334	55	16.4

<sup>1</sup> Perna, 1906.

<sup>2</sup> Agostino, 1901.

<sup>3</sup> Romiti, 1891.

<sup>4</sup> Le Double, 1903.

<sup>5</sup> Rossi, 1891.

<sup>6</sup> Only crania or calvaria having the basilar part of the occipital bone in good condition are included in the totals throughout.

<sup>7</sup> Hrdlička, 1906.

not frequent enough to be of any great significance racially. It appears to be somewhat more frequent in Asiatic crania than in European crania. But even here the material is grouped in such a way that its significance is obscured. Bearing in mind the tremendous differentiation of mankind at the present time, material studied under such headings as European, Asiatic, and Papuasian can throw very little light upon our modern anthropological problems. Especially is this true in the study of such characters as the fossa pharyngea and other anomalous conditions. There is

TABLE II

GROUPS REPRESENTED BY A SMALL NUMBER OF CRANIA BUT SHOWING A RELATIVELY HIGH FREQUENCY OF THE PHARYNGEAL FOSSA

Group	Number of Skulls	Number with Pharyngeal Fossa	Percent with Pharyngeal Fossa
Papago.....	1	1	100.0
Clear Creek, Arizona.....	6	2	33.3
Tepecano, Mexico.....	4	1	25.0
Guatemala Indian.....	6	1	16.6
Williamson County, Tennessee.....	8	1	12.5
Illinois.....	8	1	12.5
Miscellaneous Plains Indian.....	10	1	10.0
Otomi, Mexico.....	11	1	9.0
Total.....	54	9	18.5

TABLE III

GROUPS REPRESENTED BY A LARGE NUMBER OF CRANIA WHICH SHOW A LOW FREQUENCY OF THE PHARYNGEAL FOSSA

Group	Number of Skulls	Number with Pharyngeal Fossa	Percent with Pharyngeal Fossa
Tarascan, Mexico.....	130	7	5.4
Hank O'Kala, Huata, Bolivia.....	17	1	5.3
Salish, Washington.....	24	1	4.3
City of Mexico.....	25	1	4.0
Chinook.....	92	3	3.3
May's Lick, Kentucky.....	45	1	2.2
Kwakiutl.....	87	2	2.2
Eastern Eskimo.....	50	1	2.0
Takana Chullpa, Bolivia.....	50	1	2.0
Peru, Coastal Region.....	58	1	1.7
Charassani, Bolivia.....	144	2	1.4
Tama Tam Chullpa, Bolivia.....	184	2	1.0
Kupa Pukeo Chullpa, Bolivia.....	144	1	.7
Total.....	1050	24	2.3

every reason to believe that these characters develop in individuals and are transmitted by inheritance. Their local distribution is of much greater significance than their racial distribution.

TABLE IV  
GROUPS IN WHICH NO PHARYNGEAL FOSSAE WERE FOUND

Group	Number of Crania Examined
Chuckchi, Siberia.....	7
Eskimo, Indian Point, Siberia.....	32
Eskimo, St. Lawrence Island, Bering Strait.....	13
Eskimo, Alaska (Point Barrow).....	102
Athapascan, Alaska.....	8
Tsimshian.....	9
Haida.....	40
Yakima.....	15
Salish, Eburne, British Columbia.....	54
Salish, Kamloops.....	13
Salish, Nanaimo.....	13
Salish, Thompson.....	26
Salish, Bella Coola.....	20
Salish, Saanich.....	14
Salish, Lillooet.....	8
Kwakiutl, Nimpkish.....	41
Kwakiutl, Nootka.....	23
Kwakiutl, Bella Bella.....	10
Washington State, Miscellaneous.....	15
Oregon State.....	27
California.....	21
New Mexico, Pueblos.....	86
Arizona, Chaco Cañon.....	22
Colorado.....	6
New York State.....	33
Massachusetts and Connecticut.....	6
Ohio (Madisonville).....	17
Michigan (Saginaw).....	7
Virginia.....	1
Georgia.....	1
North Carolina.....	1
Florida.....	25
Mexico, Yaqui.....	7
Mexico, Casas Grandes.....	11
Mexico, Zacateco.....	4
Columbia, Santa Marta.....	10
Peru, Maranon Country.....	20
Peru, vicinity of Cuzco.....	18
Peru, Sillustani.....	11
Peru, Cachilaya.....	34

TABLE IV.—*Continued.*

## GROUPS IN WHICH NO PHARYNGEAL FOSSAE WERE FOUND

Group	Number of Crania Examined
Isle of Titicaca, Bolivia.....	64
Isle of Cojato, Bolivia.....	2
Bolivia, Chujun Paki.....	95
Bolivia, Lluchini Amaya.....	18
Bolivia, Belen Chullpa.....	8
Bolivia, Churkoni Chullpa.....	55
Bolivia, Tiahuanaco.....	3
Cape Horn,.....	3
Total.....	1079

TABLE V

## TOTAL FREQUENCY OF FOSSA PHARYNGEA IN AMERICAN CRANIA

Total Crania Examined	Total Crania with Fossa	Per cent of Crania with Fossa
2517	88	3.5

I have not much non-American material at my disposal but the small amount available suggests that the fossa pharyngea occurs with a much greater frequency in some areas than in others. Out of five crania from New Hebrides two have the fossa pharyngea well marked. Two out of four crania from the Solomon islands have it also. The number of cases are too small to permit any valid conclusions but suggest a high frequency. In a series of thirty Hindu crania and forty Bedouin-Samaritan crania the fossa pharyngea was not found.

Turning to the American material I first became interested in the fossa pharyngea during the study of a group of Basket-maker crania from Grand Gulch, Utah. About twenty-five percent of the crania examined showed a larger or smaller fossa pharyngea. A little later I encountered it again in some Mexican Indian crania. Hrdlička<sup>1</sup> also found it in his examination of California Indian crania.

I then decided to examine all the Indian and Eskimo crania in the collections of the American Museum of Natural History. The results are tabulated in Tables I to V. Considering the crania as a whole the fossa pharyngea is not of very frequent occurrence in the American Indian and Eskimo. Of the 2517 crania examined it was present in 88 of them or 3.5 percent of the cases. This per-

<sup>1</sup> Hrdlička, 1906.

centage is somewhat lower than that found by Rossi in miscellaneous collections of Asiatic and Papuasian crania.

When we consider the frequency in local groups the distribution becomes significant. All of the groups of high frequency in Table I are in the southwestern United States and Mexico. However it was not found in the crania of the pueblo peoples of New Mexico, Arizona, or Colorado. The distribution follows quite closely the distribution of the linguistic stocks tentatively grouped together as Uto-Aztecán. The crania in which it occurred with greatest frequency were moderately elongated with a cranial index averaging about 76 to 78. There is some overlapping in the distribution, notably in the case of the Otomi and Tarascan groups. This could undoubtedly be explained by contact and intermixture. On the other hand the fossa was not found among the Yaqui or Zacateco crania. In a few cases our material is inadequate to serve as a basis for valid deductions. This is true especially in the case of the Papago, Clear Creek, Arizona, and Otomi material. While our material as a whole may be taken as a fair sample in many areas, it is particularly deficient in the Plains area, Southeastern area, Plateau area, and in eastern and southern South America.

On the basis of the material at hand it seems that the frequent occurrence of the fossa pharyngea is limited to that area of North America which is or was the home of the Uto-Aztecán linguistic stock. The Basket-makers belong undoubtedly to the physical type which predominates in the Uto-Aztecán speaking peoples. It seems fair to assume that they also spoke some related dialect. From the data at hand we can only speak of southern affinities. In order to determine northern relationships it would be necessary to examine Plateau and Plains material. Such material is not at present at my disposal. The point I wish to make is that such characters as the fossa pharyngea have a similar distribution to that of the cephalic index, stature, etc., and are of equal value in determining the relationship of local groups. I hope that other collections of American crania may be studied for the presence or absence of the fossa pharyngea.

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